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Manipal Institute of Technology

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SEVENTH SEMESTER B.E (IT)
END SEMESTER MAKEUP EXAMINATIONS – JANUARRY, 2007
SUBJECT: MOBILE COMMUNICATIONS – (ICT-401)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **MAX.MARKS: 50**

Instructions to Candidates:

- **Answer any 5 FULL questions.**
- **All questions carry equal marks.**
- **Missing data may be suitably assumed**

1A. Describe different types of transmission media. Following points should be addressed while explaining transmission media:

- Physical description
- Application
- Transmission characteristics

1B. Explain various LAN technologies.

1C. Consider the (2,1,3) convolution code with

$g^{(1)} = (1\ 1\ 1)$
$g^{(2)} = (1\ 0\ 1)$

(a) Draw the trellis diagram
(b) Find the code word v corresponding to the information sequence u = (1 0 1 0 1).

[5+3+2]

2A. Why error compensation mechanisms are required in wireless communication? Explain different types of error compensation mechanisms.

2B. With necessary relations, explain co-channel and adjacent channel interference in reference to cellular communication.

2C. Consider an audio signal with spectral components in the range 300 to 3000 Hz. Assume that a sampling rate of 700 samples per seconds will be used to generate a PCM signal. For SNR = 30 dB, what is the number of uniform quantization levels needed?

[5+3+2]

3A. With suitable block diagram, explain IEEE 802.11 medium access control logic.
3B. What do you understand by the term noise? With necessary quantitative relation, explain various types of noise, which are significant from wireless communication perspective.

3C. A CRC is constructed to generate 4-bit FCS for an 11-bit message. The generator polynomial is $X^4 + X^3 + 1$. Encode the data bit sequence 10011011100 using the generator polynomial and give the code word.

[5+3+2]

4A. With suitable block diagram, explain CDMA in a DSSS environment. Necessary relations should be given to explain the transmission and receiving of signals.

4B. Using polynomial approach, explain generation of cyclic codes and error detection.
4C. Assume that two antennas are half-wave dipoles and each has a directive gain of 3 dB. If the transmitted power is 1 W and the two antennas are separated by a distance of 10 Km, what is the received power? Assume that the antennas are aligned so that the directive gain numbers are correct and that the frequency used is 100 MHz.

[5+3+2]

5A. Establish the following relations
(a) radius of earth and height of satellite from the earth
(b) the distance from the satellite to the farthest point of coverage on earth
(c) round-trip transmission delay

5B. Explain various types of logical channels specified by GSM.
5C. A receiver in an urban cellular radio system detects a 1 mW signal at d = d_o= 1 m from the transmitter. In order to mitigate co-channel interference effects, it is required that the signal received at any base station receiver from another base station transmitter which operates with the same channels must be below -100 dBm. A measurement team has determined that the average path loss exponent in the system is n = 3. Determine the major radius of each cell if a seven-cell reuse pattern is used.

[5+3+2]

6A. With neat diagram, explain GSM network architecture.
6B. With necessary diagrams, explain the security services offered by GSM.
6C. Consider a CDMA system in which users A and B have the Walsh codes (-1 1 -1 1 -1 1 -1 1) and (-1 -1 1 1 -1 -1 1 1); respectively.
(a) Show the output at the receiver if A transmits a data 1 and B does not transmit.
(b) Show the output at the receiver if A transmits a data bit 0 and B does not transmit.

[5+3+2]